

United States Department of Defense Suppliers' Passive RFID Information Guide

Version 14.0

Table of Contents

1. Introduction.....	6
1.1 Background.....	6
1.2 Potential Benefits of RFID technology.....	6
2. Implementation	8
2.1 Definitions.....	8
2.2 Implementation Approach	9
3. Guidelines and Requirements	12
3.1 Contract/Solicitation Requirements	12
3.2 Case and Pallet Tagging.....	12
3.3 Advance Shipment Notice (ASN) Transactions	12
3.4 Tag Classes and Sizes	13
3.5 Number Formats and Representations	13
3.6 EPC Identifiers.....	14
3.6.1 DoD Construct Option	14
3.6.2 DoD-96 Identifier.....	14
3.7 Tag Placement.....	20
4. Frequently Asked Questions.....	22
5. Future Amendments.....	22
6. Contacts.....	22
7. Acronyms.....	22
8. Number Conversion Table.....	23

List of Figures

<u>Figure 1. DoD-96 Identifier Format.....</u>	14
<u>Figure 2. Accepted Headers.....</u>	15
<u>Figure 3. ASCII Character to CAGE Code Character Mappings</u>	17
<u>Figure 4. Example Encoding of a 96-bit Tag (Steps 1–4)</u>	18
<u>Figure 5. Example Encoding of a 96-bit Tag (Steps 5–6)</u>	19
<u>Figure 6. RFID-enabled Label Placement on Palletized Unit Load</u>	21
<u>Figure 7. RFID-enabled Label Placement on Case (Shipping and Exterior Container). ..</u>	21
<u>Figure 8. Numeric Conversion.....</u>	23

Change History

Date of Change	Version	Reason for Change	Summary of Change
3/05	7.0	Policy Update	Updated policy information to detail our phased implementation approach.
3/05	7.0	Completed Milestones	Removed items in the “Upcoming Milestones” section that have already passed.
3/05	7.0	EPC update	Updated the definition of EPC Technology to reflect the approval of Gen 2 and note that this type of technology still needs to become readily available.
3/05	7.0	Additional Information	Added the section entitled “Number Formats and Representations.”
3/05	7.0	Data Construct Update	Changed the binary header that specifies that the tag is encoded as a DoD-96 Identity Type
3/05	7.0	Additional Information	Updated terminology in the graphic for the example encoding of a 96-bit tag to focus more on binary elements.
10/05	8.0	EPCglobal Update	Changed “Tag Data Construct” to “Identity Type” to be consistent with EPCglobal terminology.
10/05	8.0	EPCglobal Update	Revised Section 3.7 — Identity Types to reference the EPC™ Tag Data Standards document for instructions on use of EPCglobal Identity Types, including General Identifier (GID-96).
10/05	8.0	Data Construct Update	Updated Figure 2 — Example encoding of a 64-bit tag. The incorrect CAGE code was used in Step 5 in the example, resulting in the encoding CE71 133ECEFC1C35, which should actually be CE71133E 31FC1C35.
10/05	8.0	Implementation Approach Update	Updated implementation timeline (Section 2.2).
10/05	8.0	Credit Card Requirement Update	Updated Guidelines and Requirements (Section 3.0) to include information concerning exemption of credit purchases from the RFID requirement.
10/05	8.0	Tag Placement Picture Update	Updated Figure 6 in Section 3.8 (Tag Placement) to include a 2-cm border.
10/05	8.0	ASN Information	Updated Section 3.4 with new ASN information.
2/07	9.0	Policy Update, EPC Update, Additional	Updated the Introduction Section (Background, Potential Benefits, Implementation, Definitions, Implementation Approach

		Information	
2/07	9.0	Policy Update, EPC Update, Additional Information	Updated the Guidelines and Requirements Section (Contract/Solicitation Requirements, Case and Pallet Tagging, Advance Shipment Transactions, Tag Classes and Sizes, Number Formats and Representations, DoD 64 Identity Type, Encoding a 64 Bit Tag Figures, DoD 96 Identity Type, Encoding a 96 Bit Tag Figures, Tag Placement, Contacts, Acronyms
9/07	10.0	Identity Types	Updated the Guidelines and Requirements Section (Identity Types) to clarify globally unique RFID Tag IDs
7/08	11.0	Identity Types	Updated the Guidelines and Requirements Section (Identity Types) to remove the 64-bit class 0 and class 1 tags. The expiration date for DoD 64-bit identity type was 27 February 2007.
9/08	11.0	Removed Outdated Information	Removed outdated information from Background section. Removed outdated commencement information (2005-2007) and created a new, comprehensive section.
11/08	11.0	Figure Updates	Modified Figures 5 and 6 for additional clarity.
7/09	12.0	Identity Types and Filter Values	Clarified Section 3 to mirror EPCglobal Tag Data Standard v.1.5. Listed acceptable Header values.
9/09	13.0	WAWF update	Modified Section 3 to reflect WAWF updated capability for sending ASNs on DoD purchase card contracts.

DoD Suppliers' Passive RFID Information Guide

1. Introduction

1.1 Background

The goal of the United States Department of Defense (DoD) is to employ mature and emerging supply chain technologies to optimize our supply chain. RFID is a transformational technology that facilitates automated visibility and assessment management. The DoD is utilizing capabilities provided by this technology to fulfill our mission to provide knowledge-enabled logistic support to the Warfighter. Passive RFID, as a part of the AIT technology suite, supports automated data capture and facilitates DoD business process improvement in an integrated end-to-end supply chain enterprise.

In order to achieve this goal, the Department requires cooperation and concerted efforts from many entities, primarily our suppliers and the diverse U.S. military community. The DoD amended the Defense Federal Acquisition Regulations Supplement (DFARS), now requiring suppliers to affix passive RFID tags at the case (shipping and exterior containers) and pallet (palletized unit load) level for shipments of specific commodities sent to specific locations. The DoD has many contracts with its suppliers that are renewed and re-competed regularly. As these new contracts become effective, the requirement for RFID (DFARS clause) will be included in applicable contracts.

This document serves as a summary of the Department of Defense's requirements and guidelines related to passive RFID implementation for our supplier community. The Department will continue to update the guide as technologies and supporting business processes evolve.

1.2 Potential Benefits of RFID technology

Benefits associated with RFID technology are numerous for both the Department and our suppliers. The incorporation of passive RFID technology into certain business processes enables automated data capture, resulting in efficient recording of materiel. RFID technology will facilitate the Department's realization of business benefits in the areas of inventory management and visibility, operational improvements, shrinkage and asset tracking. By streamlining the Department's supply chain and improving business functions, we will better serve the DoD's customers stationed around the world.

Within each area, there are substantial collective benefits to the DoD as a whole and to our suppliers. Highlighted benefits include:

Supplier Benefits:

- Improved planning
- Faster demand responses
- Reduced Bull Whip Effect
- Streamlined business processes
- Improved efficiency in the recall of defective items

- Increased ability to ensure that product(s) remain stocked on DoD's shelves
- Faster receipt of payments for supplied goods

DoD Benefits:

- Improved inventory management
- Improved labor productivity
- Elimination of duplicate orders
- Replacement of manual procedures
- Automated receipt and acceptance
- Improved inventory and shipment visibility and management
- Reduced shrinkage
- Enhanced business processes within the DoD
- Improved asset tracking

We expect that each DoD supplier will explore how the use of RFID technology might allow their realization of unique business benefits and will determine the most cost-effective way to incorporate RFID technology into their organizational business processes.

2. Implementation

The DoD views RFID as a means to facilitate accurate, automated data capture in support of business processes in an integrated DoD supply chain enterprise. In order to continuously improve future functionality of the DoD supply chain, the Department must possess the ability to associate and communicate business information about a particular item between nodes throughout the entire supply chain — whether for transportation, supply management, maintenance, distribution, or disposal processes. As available technology matures, the DoD remains committed to user-driven RFID standards to help facilitate more expedient standard adoption and to foster competition for RFID solutions. Since 1 March 2007, the DoD has only accepted UHF Gen 2 EPC standard tags. The Department also expects to fully embrace the use of approved EPC identifiers in the DoD data environment.

As a component of a larger Automatic Identification Technology (AIT) suite, RFID technology use is allowing the Department to realize significant business benefits. Other AIT technologies, such as Active RFID, have already improved the ability of the DoD to track and trace materiel as it travels through the supply chain. Combining passive and active RFID technologies will create greater efficiencies and data accuracy. Leveraging RFID to the fullest extent possible will improve the ability to deliver to the Warfighter the right materiel, at the right place, at the right time, and in the right condition.

Our combined efforts are laying the foundation for improving supply chain efficiencies. The Department is working with various industry associations to ensure that its supplier implementation requirements correctly align with DoD RFID policy.

2.1 Definitions

For clarification, the following definitions apply to passive RFID technology and transportation infrastructure, in support of DoD supplier requirements for marking/tagging and in accordance with the DoD RFID policy:

EPC Technology: Passive RFID technology (readers, tags, etc.) that is built to the most current published EPCglobal Class 1 Generation 2 UHF Standard and meets interoperability test requirements as prescribed by EPCglobal™.

Unit Pack for Items: A MIL-STD-129 defined unit pack, specifically, the first tie, wrap, or container applied to a single item, or to a group of items, of a single stock number, preserved or unpreserved, which constitutes a complete or identifiable package.

Bulk Commodities: These items are not be tagged in accordance with passive RFID tagging requirements. Bulk commodities are products carried or shipped in rail tank cars; tanker trucks; other bulk, wheeled conveyances; or pipelines.

Examples of bulk commodities are:

- Sand
- Gravel
- Bulk liquids (water, chemicals, or petroleum products)

- Ready-mix concrete or similar construction materials
- Coal or combustibles such as firewood
- Agricultural products, such as seeds, grains, and animal feeds

In addition, munitions and explosives are not to be tagged until the following certification requirements are met for the passive RFID tag: electromagnetic effects on the environment (E3) and Hazards of Electromagnetic Radiation to Ordnance (HERO).

Case: Either an exterior container within a palletized unit load or an individual shipping container.

Exterior Container: A MIL-STD-129 defined container, bundle, or assembly that is sufficient by reason of material, design, and construction to protect unit packs and intermediate containers and their contents during shipment and storage. It can be a unit pack or a container with a combination of unit packs or intermediate containers. An exterior container may or may not be used as a shipping container.

Shipping Container: A MIL-STD-129 defined exterior container that meets carrier regulations and is of sufficient strength, by reason of material, design, and construction, to be shipped safely without further packing (e.g., wooden boxes or crates, fiber and metal drums, and corrugated and solid fiberboard boxes).

Palletized Unit Load: A MIL-STD-129 defined quantity of items, packed or unpacked, arranged on a pallet in a specified manner and secured, strapped, or fastened on the pallet so that the whole palletized load is handled as a single unit. A palletized or skidded load is not considered to be a shipping container.

2.2 Implementation Approach

Considering the volume of contracts and the variety of commodities managed, the Department has developed a plan for passive RFID tagging that delivers best value to the warfighting customer. This implementation plan provides a roadmap that targets critical distribution functions within the defense distribution depots, depot maintenance operations and strategic aerial ports.

RFID technology is being implemented through a phased approach, applying both to supplier requirements and to DoD sites. Shipments of goods and materials are being phased in by procurement methods, classes/commodities, locations and layers of packaging for passive RFID. RFID tagging is required for all DoD manufacturers and suppliers who have contracts issued containing the RFID DFARS clause. In accordance with this DFARS clause, tagging guidelines follow.

The object being shipped must be tagged if it is classified in the following Classes of Supply:

- Subclass of Class I – Packaged operational rations.
- Class II – Clothing, individual equipment, tentage, organizational tool kits, hand tools, and administrative and housekeeping supplies and equipment.
- Class IIIP – Packaged petroleum, lubricants, oils, preservatives, chemicals, and additives.
- Class IV – Construction and barrier materials.
- Class VI – Personal demand items (non-military sales items).
- Subclass of Class VIII – Medical materials (excluding pharmaceuticals, biologicals, and reagents – suppliers should limit the mixing of excluded and non-excluded materials).
- Class IX – Repair parts and components including kits, assemblies and subassemblies, repairable and consumable items required for maintenance support of all equipment, excluding medical-peculiar repair parts.

The object being shipped must be tagged if it is being shipped to any of the following locations:

Defense Logistics Agency (DLA)

- Defense Distribution Depot, Susquehanna, PA: DoDAAC W25G1U or SW3124.
- Defense Distribution Depot, San Joaquin, CA: DoDAAC W62G2T or SW3224.
- Defense Distribution Depot, Albany, GA: DoDAAC SW3121.
- Defense Distribution Depot, Anniston, AL: DoDAAC W31G1Z or SW3120.
- Defense Distribution Depot, Barstow, CA: DoDAAC SW3215.
- Defense Distribution Depot, Cherry Point, NC: DoDAAC SW3113.
- Defense Distribution Depot, Corpus Christi, TX: DoDAAC W45H08 or SW3222.
- Defense Distribution Depot, Hill, UT: DoDAAC SW3210.
- Defense Distribution Depot, Jacksonville, FL: DoDAAC SW3122.
- Defense Distribution Depot, Oklahoma City, OK: DoDAAC SW3211.
- Defense Distribution Depot, Norfolk, VA: DoDAAC SW3117.
- Defense Distribution Depot, Puget Sound, WA: DoDAAC SW3216.
- Defense Distribution Depot, Red River, TX: DoDAAC W45G19 or SW3227.
- Defense Distribution Depot, Richmond, VA: DoDAAC SW0400.

- Defense Distribution Depot, San Diego, CA: DoDAAC SW3218.
- Defense Distribution Depot, Tobyhanna, PA: DoDAAC W25G1W or SW3114.
- Defense Distribution Depot, Warner Robins, GA: DoDAAC SW3119.

USTRANSCOM

- Air Mobility Command Terminal, Charleston Air Force Base, Charleston, SC: Air Terminal Identifier Code CHS.
- Air Mobility Command Terminal, Naval Air Station, Norfolk, VA: Air Terminal Identifier Code NGU.
- Air Mobility Command Terminal, Travis Air Force Base, Fairfield, CA: Air Terminal Identifier Code SUU.

The following are exempted from RFID tagging requirements:

- Shipments of bulk commodities.
- Objects supplied to the DoD under contracts that include the clause at FAR 52.213-1, Fast Payment Procedures.

At one time, the DoD established a timeline to require suppliers to apply passive tags at the unit pack level. The Department continues to evaluate the appropriate time frame to begin tagging at the unit pack level and will promulgate this requirement in advance of future requirement issuances.

3. Guidelines and Requirements

The cost of implementing and operating RFID technology is considered a normal cost of conducting business. DoD contractors should work directly with their contracting officers concerning any questions regarding this requirement.

DoD Purchase Cards may be used to acquire items on existing government contracts and also to acquire items directly from suppliers that are not on a specific government contract. If a DoD Purchase Card is used to acquire items that are on a DoD contract, those items should be passive RFID tagged. If a DoD Purchase Card is used to acquire items that are not on a DoD contract, those items do not need to be passive RFID tagged. If DoD customers desire to apply a passive RFID tag on shipments under the latter type of purchase arrangement, (1) This requirement must be specifically requested of the shipping supplier/vendor, and (2) The shipment must be accompanied by an appropriate ASN containing the shipment information associated to the appropriate passive RFID tag. WAWF version 4.1 allows vendors to generate ASNs for items shipped under contracts paid with a DoD purchase card and allows the acceptors to record acceptance.

3.1 Contract/Solicitation Requirements

All solicitations awarded with the appropriate DFARS contract clause require that passive RFID tags be affixed at the case (shipping and exterior container) and pallet (palletized unit load) levels for materiel delivered to the Department, in accordance with the phased implementation plan, which is located above in section 2.2, entitled: “*Implementation Approach.*” Suppliers are to ensure that: 1) the data encoded on each passive RFID tag are globally unique (please refer to *Section 3.6 EPC Identifiers* for additional clarification on unique RFID tags); 2) each passive tag is readable at the time of shipment; 3) the passive tag is affixed at the appropriate location on the specific level(s) of packaging; and 4) ASN is submitted thru WAWF.

3.2 Case and Pallet Tagging

Cases (shipping and exterior containers) and pallets (palletized unit loads) of materiel in the above specified Classes of Supply must be tagged at the point of origin (manufacturer/vendor) with passive RFID tags for those contracts that contain the appropriate DFARS clause. If your shipment to the DoD requires the application of a passive RFID tag, all of the outermost boxes on the shipment require an RFID tag. Regardless of whether it is assembled on a shrink-wrapped pallet or it is an individual case shipment, the outermost box requires a tag. Additionally, the shrink-wrapped pallet also requires an RFID tag. If a shrink-wrapped pallet requires a Military Shipping Label (MSL), then it also requires an RFID tag. The RFID tag and data written to the tag must meet the published DoD standards as outlined in following sections.

3.3 Advance Shipment Notice (ASN) Transactions

The current acceptable method for ASN submission is through WAWF. The RFID DFARS clause requires that all vendors who are contractually obligated to affix passive RFID tags to materiel must also send an ASN via WAWF. The ASN is not a new process/transaction, but rather the same existing Material Inspection Receiving Report (MIRR) transaction being sent to WAWF, with additional data (RFID data elements) added to the transaction. In April 2005, WAWF added the RFID tag ID as an additional data element in the MIRR. If you have questions

about WAWF, please visit <https://wawf.eb.mil> or contact the DISA Customer Service Center (WAWF Help Desk) at 1-866-618-5988 or 801-605-7095.

Additional Information

The Advance Shipment Notice (ASN) transaction enables the sender to relate the passive RFID tag ID at various levels of detail to the contents and configuration of a shipment. The tag ID is written to the tag in binary format. However, within the ASN, you must provide the ID of every RFID tag in a shipment and must represent this passive tag ID in a hexadecimal format. Typically, the hexadecimal format is the format used by passive RFID software in printers and readers, thus the binary to hexadecimal translation process should be done automatically by the software.

3.4 Tag Classes and Sizes

The DoD established an expiration date (“sunset date”) of 28 February 2007 for EPC Gen 1 Class 0 and Class 1 Specification tags and will now accept only UHF Gen 2 EPC Standard tags. This migration to the UHF Gen 2 tag supports the DoD’s goal of implementing open, user-driven standards.

3.5 Number Formats and Representations

The following sections of this document discuss the specific details of generating the unique number or ID that must be programmed into each RFID tag. In this guide, numbers may be represented in binary, decimal or hexadecimal format as indicated in the surrounding text. It should be noted that the RFID tag stores its ID in electronic memory which stores data in binary format. Generating the ID being programmed to the tag involves the setting of specific bit patterns in specific positions of the tag memory. Thus, the contents of the RFID tag are often represented in binary format. However, once determined by the encoding process, this ID is typically represented in hexadecimal format (e.g., 1110 (binary) = 14 (decimal) = E (hexadecimal)).

Suppliers may purchase pre-programmed RFID tags from third-party providers. However, it is the responsibility of the supplier, with whom the Department holds the contract, to ensure that every RFID tag the supplier ships to the Department is encoded with a globally unique identified (unique tag ID), regardless of the selected tag encoding scheme. It is never acceptable for a supplier to repeat a tag ID across two or more RFID tags.

Regardless of how the supplier procures the RFID tag, they must apply tags to goods shipped to the DoD and transmit an ASN indicating the relationship of this ID to a specific shipment as previously discussed. Within this ASN, a supplier must provide the ID of every RFID tag in a shipment and this ID must be represented in hexadecimal format.

The supplier has three options for entering data into the WAWF website. The supplier can manually enter the RFID tag ID into the WAWF website, use an 856 EDI document, or use a User Defined File (UDF) to transfer into WAWF. The latter two methods facilitate a more automated data capture and ASN creation process. See Section 3.3 for more details on the ASN.

3.6 EPC Identifiers

Suppliers to DoD must encode an approved RFID tag using the instructions provided in the EPC™ Tag Data Standards document. Suppliers that are EPCglobal subscribers and possess a GS1 company prefix may use any of the EPC Identifiers and encoding instructions described in the EPC™ Tag Data Standards document to encode tags. Please consult the EPC™ Tag Data Standards document at: <http://www.epcglobalinc.org/standards> for details.

Suppliers who choose to employ the DoD construct will use their previously assigned Commercial and Government Entity (CAGE) code and encode the tags per the rules that follow. It is essential to understand that the filter value in the DoD-96 identifier is not part of the Electronic Product Code. The filter value does not contribute to the unique identity of the EPC. For example, it is not permissible to attach two RFID tags to two different physical objects where both tags contain the same EPC, even if the filter values are different on the two tags.

3.6.1 DoD Construct Option

This option should be selected by any DoD supplier who is:

- Not a member of EPCglobal and does not intend to join
- Has already been assigned a CAGE code

Similar to the unique company prefix assigned to EPCglobal members/subscribers, the CAGE code is a unique identifier assigned and managed by the DoD. It is a sequence of five alphanumeric characters used to uniquely identify the supplier among all other suppliers. It is used to ensure that the RFID tag from a given supplier cannot contain the same identifier as those from another supplier. The supplier's CAGE code is required for encoding of all RFID tag classes and sizes.

3.6.2 DoD-96 Identifier

DoD's expiration date ("sunset date") of 28 February 2007 for EPC Gen 1 Class 0 and Class 1 Specification tags has passed. Therefore, all 64-bit encodings (including all encodings that used 2-bit headers) are obsolete, and must not be used in new applications. The 96-bit tag is comprised of 4 fields as indicated in Figure 1.

Header	Filter	Government Managed Identifier	Serial Number
8 bits	4 bits	48 bits	36 bits

Figure 1. DoD-96 Identity Type Format

Error! Reference source not found.

The details of what information to encode into these fields are explained below. After all the field values have been determined, the entire contents of the tag can be viewed as a single unique number used to identify a shipment to the DoD. For further clarification on unique RFID tags, please refer to *Section 3.6 EPC Identifiers*.

Fields:

Header — specifies that the tag data are encoded as a DoD 96-bit tag construct. Use binary number 0010 1111. Detailed in Figure 2 are the only Headers accepted by the Department of Defense, along with their corresponding binary codes. Please apply the appropriate header to each tag.

Hexadecimal Header	8-Bit Binary Header	Identifiers
2F	00101111	DoD-96
30	00110000	SGTIN-96
31	00110001	SSCC-96
33	00110011	GRAI-96
34	00110100	GIAI-96
35	00110101	GID-96
36	00110110	SGTIN-198
37	00110111	GRAI-170
38	00111000	GIAI-202

Figure 2: Accepted Headers

For additional information on acceptable Headers, please see the most recent version of the EPC Tag Data Standard at: <http://www.epcglobalinc.org/standards/tds/>.

Filter — identifies a pallet (palletized unit load), case (shipping and exterior container), or unit pack associated with tag, represented in binary number format using the following values:

- 0000 = pallet (palletized unit load)
- 0001 = case (shipping and exterior container)
- 0010 = unit pack
- all other combinations = reserved for future use

It is essential to understand that the filter value in the DoD-96 Identifier is not part of the Electronic Product Code. The filter value does not contribute to the unique identity of the EPC. For example, it is not permissible to attach two RFID tags to two different physical objects where both tags contain the same EPC, even if the filter values are different on the two tags. Please note that the filter value is NOT part of the unique ID.

Government Managed Identifier — This field will be encoded with the respective supplier's CAGE code. This code identifies the supplier and ensures uniqueness of serial number across all suppliers, and is represented in standard 8-bit ASCII format. For the DoD-96 Identifier, an ASCII space character must be pre-pended to the CAGE code to make the code a total of 6 ASCII characters. Figure 3 can be used to determine the correct binary value of any valid CAGE code character.

Serial Number — Uniquely identifies up to $2^{36} = 68,719,476,736$ tagged items, represented in binary number format. After the serial number is converted into binary format, it must be left-padded with zeros to 36 bits total. The “serial number” required in the RFID tag ID data construct does not refer to the serial number of the product being shipped. The “serial number” in the RFID tag ID is merely a unique number assigned by the supplier to represent a specific RFID tag. This “serial number”, combined with the supplier’s Government Managed Identifier, or CAGE code, together with the header and filter values comprises the RFID tag ID.

CAGE Code Character	Binary Value
A	0100 0001
B	0100 0010
C	0100 0011
D	0100 0100
E	0100 0101
F	0100 0110
G	0100 0111
H	0100 1000
I	Invalid CAGE Character
J	0100 1010
K	0100 1011
L	0100 1100
M	0100 1101
N	0100 1110
O	Invalid CAGE Character
P	0101 0000
Q	0101 0001
R	0101 0010
S	0101 0011
T	0101 0100
U	0101 0101
V	0101 0110
W	0101 0111
X	0101 1000
Y	0101 1001
Z	0101 1010
0	0011 0000
1	0011 0001
2	0011 0010
3	0011 0011
4	0011 0100
5	0011 0101
6	0011 0110
7	0011 0111
8	0011 1000
9	0011 1001
SPACE	0010 0000

Figure 3. ASCII Character to CAGE Code Character Mappings

Figures 4 and 5 outline the steps of encoding a 96-bit tag using the DoD-96 identifier. Refer to Figure 8 for hexadecimal conversion assistance.

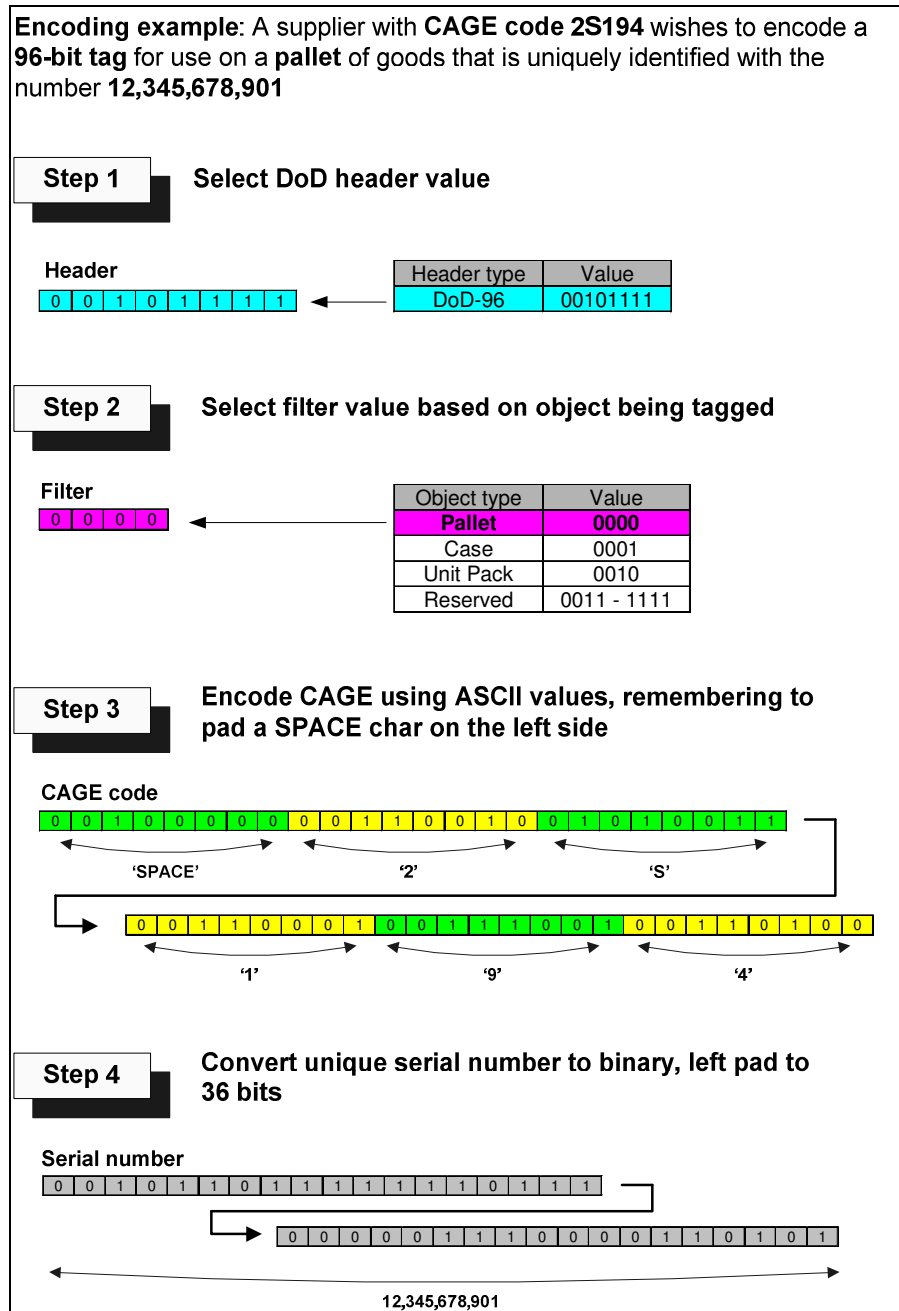


Figure 4. Example Encoding of a 96-bit Tag (Steps 1–4)

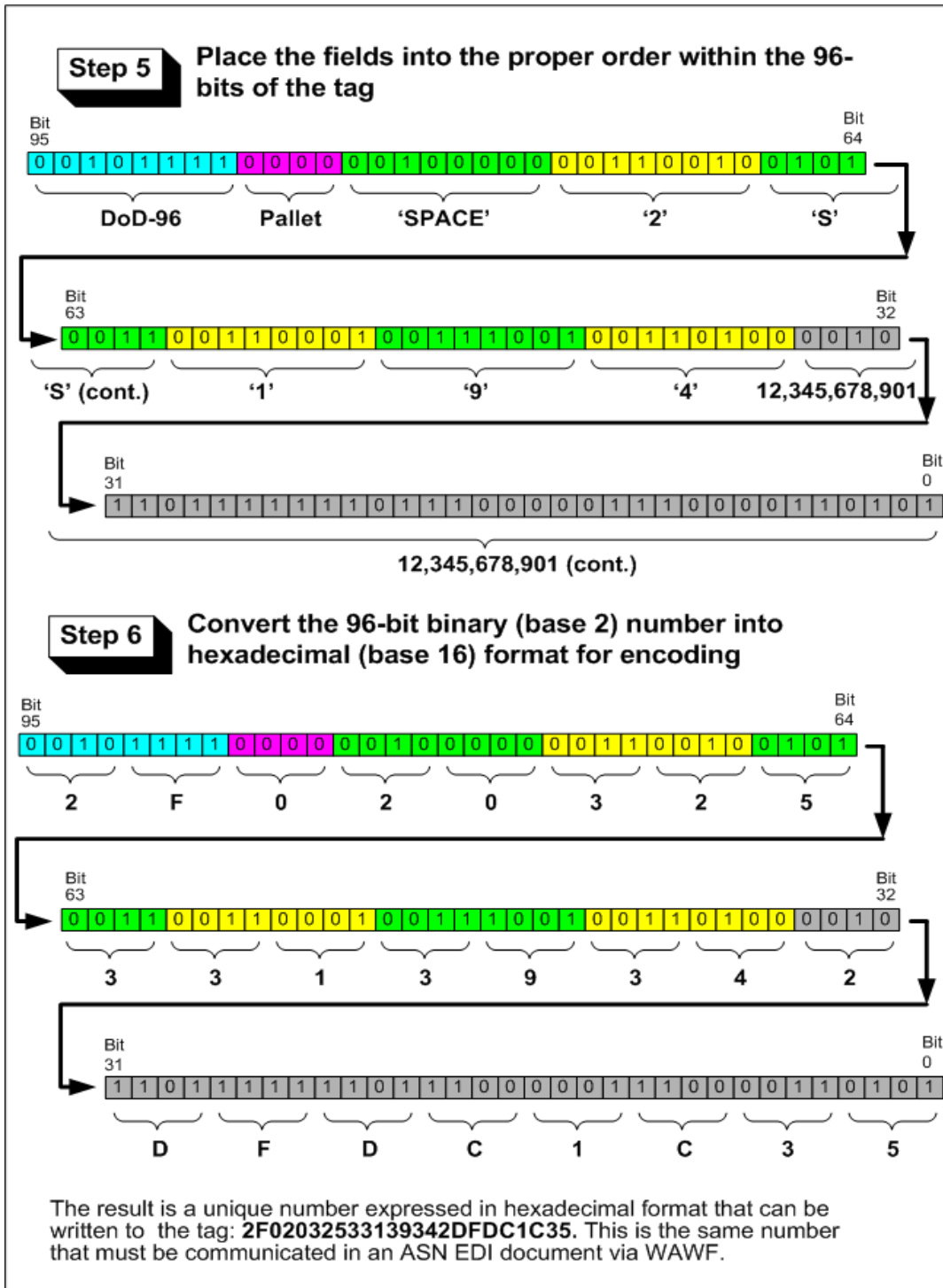


Figure 5. Example Encoding of a 96-bit Tag (Steps 5–6)

3.7 Tag Placement

The transponder (RFID tag) may be integrated with the shipping label (RFID-enabled labels), or may be an independent entity (where a separate shipping label would also be necessary).

All address labels and RFID tags should be affixed at a suitable location where there is a minimum risk of damage and highest potential for successful interrogation. See Figures 6 and 7.

The bottom edge of the address label containing the unit load information should be within the range of 81 cm to 122 cm (32 to 48 in) from the bottom of the pallet (palletized unit load). If the loaded pallet (palletized unit load) is less than 102 cm (40 in) in height, the label should be placed as high as possible on the pallet (palletized unit load), but not closer than 5 cm (2 in) to the natural top of the unit load.

Each unit load must include one RF tag, independent or part of an address label, which contains the unit load information.

RFID-enabled labels are to be applied to shipping containers or palletized unit loads, in accordance with the standards presented in MIL-STD-129.

- The address label should be placed on the identification-marked side and right of center on a vertical face, allowing a minimum of 5 cm (2 in) from all edges. An additional address label may be placed on the identification-marked end for styles that, because of their configuration, allows access by materials handling equipment only to the end of the container.
- The RFID-enabled label should not be placed over a seam, nor should sealing tape or bands be placed over the label in a manner that interferes with the scanning of the label bar codes or reading the transponder data.
- The RFID-enabled label or passive RFID tag attached separately should not be placed in a manner that overlaps any other existing RFID transponder. There should be at least a 10-cm (4-in) separation.
- If RFID-enabled address labels are not used, attach a separate passive RFID tag and a separate address label(s).
- The passive RFID tag should be placed on the identification-marked side and right of center on a vertical face, allowing a minimum of 5 cm (2 in) from all edges.
- The passive RFID tag on a palletized unit load should be attached using the same requirements for attaching an MSL to a palletized unit load and should not be attached to an exterior container if the cargo within the exterior container will not be removed for receipt processing and storage.

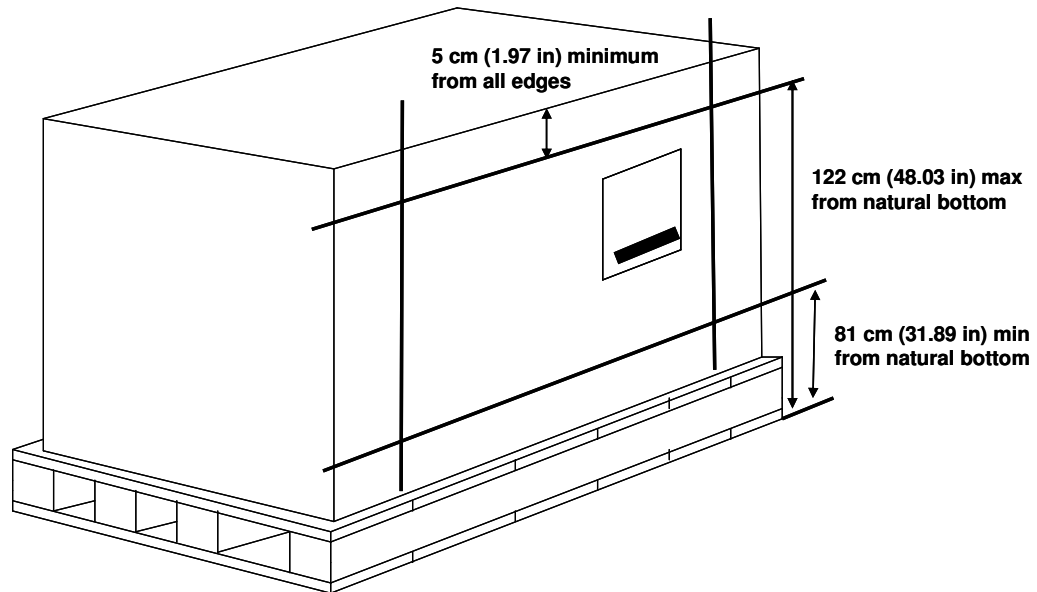


Figure 6. RFID-enabled Label Placement on Palletized Unit Load

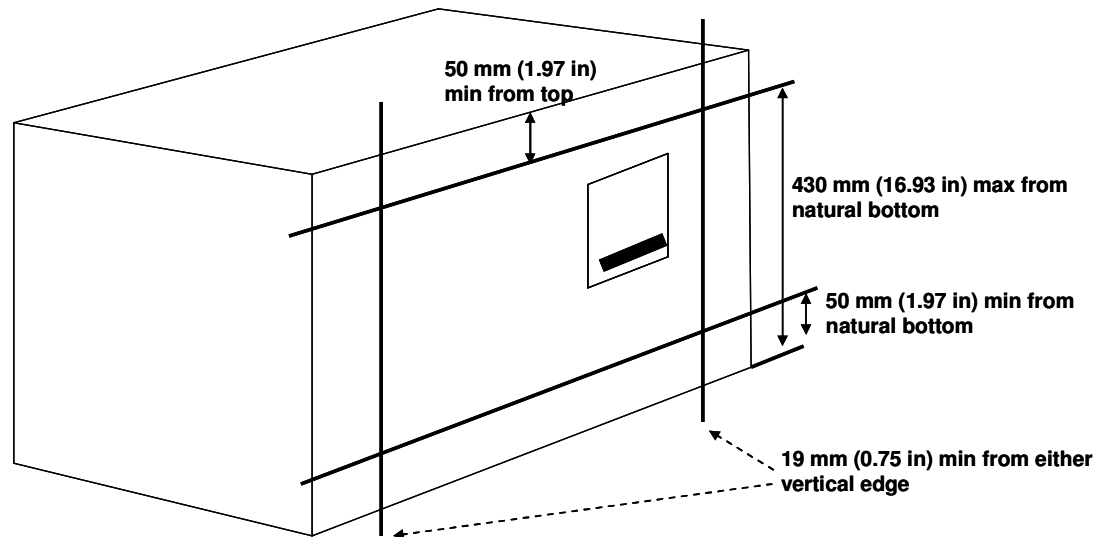


Figure 7. RFID-enabled Label Placement on Case (Shipping and Exterior Container)

4. Frequently Asked Questions

For the answers to frequently asked questions as well as additional information regarding the RFID policy please refer to the Department of Defense website <http://www.dodrfid.org>. The website contains FAQs, background information, and Policy to assist your efforts in being RFID compliant.

5. Future Amendments

Future policy amendments may be needed in order to keep up with evolving RFID standards, technology, and the business environments. DoD RFID policies and business rules will continue to be refined as passive RFID capabilities are implemented over the next few months.

Please check for updates to the *Supplier Implementation Plan* (<http://www.dodrfid.org/supplierimplementationplan.htm>) and this *Supplier Passive RFID Information Guide* (<http://www.dodrfid.org/supplierguide.htm>), for implementation dates and details as well as detailed information concerning the applicable commodities.

6. Contacts

We strongly encourage suppliers to investigate the benefits to their organization of integrating RFID technologies into their business processes. Below are contacts that will help suppliers in the effort.

- Visit EPCglobal on the internet: <http://www.epcglobalinc.org/>
- Additional information and RFID FAQs are available at <http://www.dodrfid.org>

Please note: This guide is subject to updates and information contained in this guide is subject to change. Please use <http://www.dodrfid.org> to keep abreast of the most current requirements.

7. Acronyms

ASN	Advance Shipment Notice
CAGE	Commercial and Government Entity
EPC	Electronic Product Code
RFID	Radio Frequency Identification
UHF	Ultra High Frequency
UID	Unique Identification

8. Number Conversion Table

The following table is included as a convenience to the user. It can be used to determine the hexadecimal and binary representations of the decimal numbers 0–15 inclusive.

Decimal	Hex	Binary		Decimal	Hex	Binary
0	0	0000		8	8	1000
1	1	0001		9	9	1001
2	2	0010		10	A	1010
3	3	0011		11	B	1011
4	4	0100		12	C	1100
5	5	0101		13	D	1101
6	6	0110		14	E	1110
7	7	0111		15	F	1111

Figure 8. Numeric Conversion